CLAIMS:

1. A retaining wall for retaining an embankment or similar including a plurality of tyres arranged in a plurality of courses adjacent to the embankment and such that a central axis of each tyre is offset from vertical.

2. A retaining wall as claimed in claim 1 wherein each tyre's central axis is offset from vertical at a batter angle ranging from 10°C to 20°C.

3. A retaining wall as claimed in claim 1 or claim 2 wherein adjacent courses:

- are separated by a fill material, optionally by a distance that is half a tyre in diameter; or
- abut.

4. A retaining wall as claimed in any one of the preceding claims wherein each tyre is at least partially filled with a fill material, and further fill material fills gaps between the tyres, and between the tyres and the embankment.

5. A retaining wall as claimed in claim 4 wherein the fill material includes:

- concrete at the lowest course of tyres; and/or
- a granular or particulate, optionally free draining material.

6. A retaining wall as claimed in claim 5 wherein the granular or particulate material is cobble, sand and/or shredded tyre.

7. A retaining wall as claimed in any one of the preceding claims wherein at least some of the tyres are each cut:

(a) in a plane between opposing side walls thereof and are arranged in the wall so that both side walls generally face downwards; and/or

(b) to remove a substantial proportion of one of the side walls and are arranged in the wall so that the remaining uncut side wall generally faces downwards.

8. A retaining wall as claimed in claim 7 wherein in (a), a section of the tyre remains uncut to provide a hinge for pivoting of the tyre portions thereabout.

9. A retaining wall as claimed in claim 7 or claim 8 wherein in (b), the removed side wall is arranged in the tyre to be adjacent to the remaining side wall when the tyre is located in the wall.

10. A retaining wall as claimed in claim 9 wherein a liner is positioned between the removed and remaining side walls to cover the lower opening of the tyre when arranged in the wall.

~~11. A retaining wall for retaining an embankment or similar that is formed from a plurality of tyres arranged in a plurality of courses adjacent to the embankment wherein at least some of the tyres are each cut:~~

~~(a) in a plane between opposing side walls thereof and such that a section of the tyre remains uncut to provide a hinge for pivoting of the tyre portions thereabout, and so that the tyres can be arranged in the wall such that both side walls generally face downwards; and/or~~

~~(b) to remove a substantial proportion of one of the side walls wherein the removed side wall is arranged in the tyre to be adjacent to the remaining side wall, and the tyres are arranged in the wall so that the remaining uncut side wall generally faces downwards.~~

12. A retaining wall as claimed in claim 11 wherein in (b), a liner is positioned between the removed and remaining side walls to cover the lower opening of the tyre when arranged in the wall.

13. A retaining wall as claimed in claim 11 or claim 12 wherein the cut tyres are substantially filled with fill material in the finished retaining wall.

~~14. A retaining wall as claimed in any one of claims 11 to 13~~ wherein the courses of the retaining wall are constructed in a manner as defined in any one of ~~claims~~ claim 1

~~to 6.~~

~~15. A retaining wall for retaining an embankment~~ or similar including a reinforcing ~~section~~ extending rearwardly into the ~~wall~~ from an outer portion thereof, the reinforcing section being part of the retaining wall and being formed from:

(a) portions/sections cut from one or more tyres; ~~and/or~~

(b) conveyor belt portions/sections.

16. A retaining wall as claimed in claim 15 wherein the reinforcing section is attached to the outer portion of the wall.

~~17. A retaining wall as claimed in claim 15 or claim 16 wherein the reinforcing section is formed by joining together a plurality of tyre tread sections, a plurality of tyre side wall sections and/or a plurality of conveyor belt sections.~~

~~18. A retaining wall as claimed in claim 17 wherein the sections are joined to define a grid formation.~~

19. A retaining wall as claimed in claim 18 wherein individual sections are attached, linked, or threaded to/through adjacent sections to define the grid formation.

20. A retaining wall as claimed in ~~any one of claims 15 to 19~~ claim 15 wherein the reinforcing section is formed from a plurality of sections cut from mining conveyor belts.

21. A retaining wall as claimed in ~~any one of claims 15 to 20~~ claim 15 wherein the outer portion is formed from a plurality of elements arranged in a plurality of courses, and a reinforcing section is provided for each course and is arranged to extend generally horizontally or be downwardly inclined into the wall.

22. A retaining wall as claimed in ~~any one of claims 15 to 21~~ claim 15 wherein an outer face of the wall is defined by a plurality of tyres that are arranged in a plurality of courses adjacent to the embankment, wherein at least some of the tyres in the wall have an intact tread portion.

~~23. A retaining wall as claimed in any one of claims 15 to 22~~ wherein the outer portion is formed from a plurality of tyres in a manner as defined in any one of claims 1 to 14.

~~24. A retaining wall as claimed in any one of claims 1 to 14, or 21 or 23~~, wherein the plurality of courses define a row and wherein a plurality of rows are arranged adjacent to the embankment.

25. A method for forming a retaining wall for retaining an embankment or similar comprising the steps of:

(a) forming a base for the retaining wall adjacent to the embankment and that slopes downwardly to the embankment from surrounding ground; and

(b) arranging a plurality of tyres in a plurality of courses adjacent to the embankment and along the base.

~~26. A method as claimed in claim 25~~ wherein the base is formed to provide an offset in the wall from vertical at a batter angle of 10° to 20°.

27. A method as claimed in claim 26 wherein the central axis of each tyre in the wall is offset from vertical at an angle that is approximately equal to the batter angle.

28. A method as claimed in ~~any one of claim 28 to 30~~, wherein each course of tyres is arranged to be offset along the line of the course from adjacent course(s).

29. A method as claimed in ~~any one of claims 25 to 28~~ wherein in step (b) a course of tyres is laid and each tyre is at least partially in-filled with a fill material prior to laying the next course.

30. A method as claimed in claim 29 wherein each tyre in a course is filled such that:

- tyre(s) in the next course abut that tyre; or
- tyre(s) in the next course are separated by the fill material from that tyre.

31. A method as claimed in claim 29 ~~or claim 30~~ wherein during filling of each course, additional fill

material is provided to fill gaps between tyres, and between the tyres and the embankment.

~~32. A method as claimed in any one of claims 25 to 31~~ wherein, prior to laying a course, at least some of the tyres in the course are each cut;

(i) in a plane between opposing side walls thereof and are arranged in the walls so that both side walls generally face downwards; and/or

(ii) to remove a substantial proportion of one of the side walls, and are arranged in the walls so that the ~~remaining~~ uncut side wall generally faces downwards.

~~33~~. A method as claimed in claim ~~32~~ wherein in (i), a section of the tyre remains uncut to provide a hinge for pivoting of the tyre portions thereabout.

~~34~~. A method as claimed in claim ~~32~~ ~~or claim 33~~ wherein in (ii) the removed side wall is arranged in the tyre to be adjacent to the remaining side wall when the tyre is located in the wall.

~~35~~. A method as claimed in claim ~~34~~ wherein a liner is positioned between the removed and remaining side walls to cover the lower opening of the tyre when the tyre is arranged in the wall.

~~36. A method for forming a retaining wall from a~~ plurality of tyres comprising the step of cutting at least some of the tyres:

(a) in a plane between opposing side walls thereof, wherein a section of the tyre remains uncut to provide a hinge for pivoting of the tyre portions thereabout, and then arranging those tyres in the walls so that both side walls generally face downwards; and/or

(b) to remove a substantial portion of one of the side walls, with the removed side wall being arranged in the tyre to be adjacent to the remaining side wall, and then arranging those tyres in the wall so that the ~~remaining~~ uncut side wall generally faces downwards.

Sub H1

~~36~~ 37. A method as claimed in ~~claim 36~~ wherein in (b), a liner is positioned between the removed and remaining side walls to cover the lower opening of the tyre when it is arranged in the wall.

~~37~~ 38. A method as claimed in ~~claim 36~~ or ~~claim 37~~ wherein the cut tyres are substantially filled with a fill material in the finished retaining wall.

Sub H1 Cancel

~~39. A method as claimed in any one of claims 36 to 38~~ wherein the courses are constructed in accordance with the ~~method as defined in any one of claims 25 to 31.~~

~~40. A method for forming a retaining wall for retaining an embankment or similar including the step of positioning in the wall a reinforcing section that is formed from portions/sections cut from one or more tyres or from one or more conveyor belts.~~

Sub H1

~~41~~ 42. A method as claimed in ~~claim 40~~ wherein an outer face of the wall is defined by arranging a plurality of elements in a plurality of courses adjacent to the embankment to define the face.

~~42~~ 43. A method as claimed in ~~claim 41~~ wherein, prior to or after the arranging of each course, a reinforcing section is attached to that course.

Sub C9

~~43. A method as claimed in claim 42 wherein, prior to attaching the reinforcing section to each course, the reinforcing section is pre-formed into a grid structure by joining together a plurality of tyre tread sections, a plurality of tyre side wall sections and/or a plurality of conveyor belt sections.~~

~~44. A method as claimed in any one of claims 41 to 43 wherein the elements are tyres.~~

Sub H1

~~45~~ 46. A method as claimed in ~~claim 44~~ wherein at least some of the tyres have an intact tread portion.

~~46. A method as claimed in any one of claims 41 to 45 wherein the face of the wall is formed using a method as defined in any one of claims 25 to 39.~~

D17 47. A method as claimed in claim 40 ~~any one of claims 40 to 46~~ wherein the conveyor belt sections are cut from a mining conveyor belt.

Add D187

Add G2

AMENDED CLAIMS

[received by the International Bureau on 4 August 1998 (04.08.98);
original claims 1, 2, 15, 18 and 40 amended; new claim 48 added;
remaining claims unchanged (7 pages)]

1. A retaining wall for retaining an embankment or similar including a plurality of tyres arranged in a plurality of courses adjacent to the embankment and such that a central axis of each tyre in an outer face of the retaining wall is offset from both vertical and horizontal.

2. A retaining wall as claimed in claim 1 wherein each tyre's central axis is offset from vertical at a batter angle ranging from 10° to 20°.

3. A retaining wall as claimed in claim 1 or claim 2 wherein adjacent courses:

- are separated by a fill material, optionally by a distance that is half a tyre in diameter; or
- abut.

4. A retaining wall as claimed in any one of the preceding claims wherein each tyre is at least partially filled with a fill material, and further fill material fills gaps between the tyres, and between the tyres and the embankment.

5. A retaining wall as claimed in claim 4 wherein the fill material includes:

- concrete at the lowest course of tyres; and/or
- a granular or particulate, optionally free draining material.

6. A retaining wall as claimed in claim 5 wherein the granular or particulate material is cobble, sand and/or shredded tyre.

7. A retaining wall as claimed in any one of the preceding claims wherein at least some of the tyres are each cut:

(a) in a plane between opposing side walls thereof and are arranged in the wall so that both side walls generally face downwards; and/or

(b) to remove a substantial proportion of one of the side walls and are arranged in the wall so that the remaining uncut side wall generally faces downwards.

8. A retaining wall as claimed in claim 7 wherein in (a), a section of the tyre remains uncut to provide a hinge for pivoting of the tyre portions thereabout.

9. A retaining wall as claimed in claim 7 or claim 8 wherein in (b), the removed side wall is arranged in the tyre to be adjacent to the remaining side wall when the tyre is located in the wall.

10. A retaining wall as claimed in claim 9 wherein a liner is positioned between the removed and remaining side walls to cover the lower opening of the tyre when arranged in the wall.

11. A retaining wall for retaining an embankment or similar that is formed from a plurality of tyres arranged in a plurality of courses adjacent to the embankment wherein at least some of the tyres are each cut:

(a) in a plane between opposing side walls thereof and such that a section of the tyre remains uncut to provide a hinge for pivoting of the tyre portions thereabout, and so that the tyres can be arranged in the wall such that both side walls generally face downwards; and/or

(b) to remove a substantial proportion of one of the side walls wherein the removed side wall is arranged in the tyre to be adjacent to the remaining side wall, and the tyres are arranged in the wall so that the remaining uncut side wall generally faces downwards.

12. A retaining wall as claimed in claim 11 wherein in (b), a liner is positioned between the removed and remaining side walls to cover the lower opening of the tyre when arranged in the wall.

13. A retaining wall as claimed in claim 11 or claim 12 wherein the cut tyres are substantially filled with fill material in the finished retaining wall.

14. A retaining wall as claimed in any one of claims 11 to 13 wherein the courses of the retaining wall are constructed in a manner as defined in any one of claims 1

to 6.

15. A retaining wall for retaining an embankment or similar including a reinforcing section extending rearwardly into the wall from an outer portion thereof, the reinforcing section being part of the retaining wall and being formed from:

(a) portions/sections cut from one or more tyres and arranged in a grid-type formation;

(b) strips cut from one or more tyres; and/or

(c) conveyor belt portions/sections.

16. A retaining wall as claimed in claim 15 wherein the reinforcing section is attached to the outer portion of the wall.

17. A retaining wall as claimed in claim 15 or claim 16 wherein the reinforcing section is formed by joining together a plurality of tyre tread sections, a plurality of tyre side wall sections and/or a plurality of conveyor belt sections.

18. A retaining wall as claimed in claim 17 wherein the strips or conveyor belt portions/sections are joined to define a grid formation.

19. A retaining wall as claimed in claim 18 wherein individual sections are attached, linked, or threaded to/through adjacent sections to define the grid formation.

20. A retaining wall as claimed in any one of claims 15 to 19 wherein the reinforcing section is formed from a plurality of sections cut from mining conveyor belts.

21. A retaining wall as claimed in any one of claims 15 to 20 wherein the outer portion is formed from a plurality of elements arranged in a plurality of courses, and a reinforcing section is provided for each course and is arranged to extend generally horizontally or be downwardly inclined into the wall.

22. A retaining wall as claimed in any one of claims 15 to 21 wherein an outer face of the wall is defined by a plurality of tyres that are arranged in a plurality of

courses adjacent to the embankment, wherein at least some of the tyres in the wall have an intact tread portion.

23. A retaining wall as claimed in any one of claims 15 to 22 wherein the outer portion is formed from a plurality of tyres in a manner as defined in any one of claims 1 to 14.

24. A retaining wall as claimed in any one of claims 1 to 14, or 21 or 23, wherein the plurality of courses define a row and wherein a plurality of rows are arranged adjacent to the embankment.

25. A method for forming a retaining wall for retaining an embankment or similar comprising the steps of:

(a) forming a base for the retaining wall adjacent to the embankment and that slopes downwardly to the embankment from surrounding ground; and

(b) arranging a plurality of tyres in a plurality of courses adjacent to the embankment and along the base.

26. A method as claimed in claim 25 wherein the base is formed to provide an offset in the wall from vertical at a batter angle of 10° to 20°.

27. A method as claimed in claim 26 wherein the central axis of each tyre in the wall is offset from vertical at an angle that is approximately equal to the batter angle.

28. A method as claimed in any one of claim 28 to 30, wherein each course of tyres is arranged to be offset along the line of the course from adjacent course(s).

29. A method as claimed in any one of claims 25 to 28 wherein in step (b) a course of tyres is laid and each tyre is at least partially in-filled with a fill material prior to laying the next course.

30. A method as claimed in claim 29 wherein each tyre in a course is filled such that:

- tyre(s) in the next course abut that tyre; or
- tyre(s) in the next course are separated by the fill material from that tyre.

31. A method as claimed in claim 29 or claim 30 wherein during filling of each course, additional fill material is provided to fill gaps between tyres, and between the tyres and the embankment.

32. A method as claimed in any one of claims 25 to 31 wherein, prior to laying a course, at least some of the tyres in the course are each cut;

(i) in a plane between opposing side walls thereof and are arranged in the walls so that both side walls generally face downwards; and/or

(ii) to remove a substantial proportion of one of the side walls, and are arranged in the walls so that the remaining uncut side wall generally faces downwards.

33. A method as claimed in claim 32 wherein in (i), a section of the tyre remains uncut to provide a hinge for pivoting of the tyre portions thereabout.

34. A method as claimed in claim 32 or claim 33 wherein in (ii) the removed side wall is arranged in the tyre to be adjacent to the remaining side wall when the tyre is located in the wall.

35. A method as claimed in claim 34 wherein a liner is positioned between the removed and remaining side walls to cover the lower opening of the tyre when the tyre is arranged in the wall.

36. A method for forming a retaining wall from a plurality of tyres comprising the step of cutting at least some of the tyres:

(a) in a plane between opposing side walls thereof, wherein a section of the tyre remains uncut to provide a hinge for pivoting of the tyre portions thereabout, and then arranging those tyres in the walls so that both side walls generally face downwards; and/or

(b) to remove a substantial portion of one of the side walls, with the removed side wall being arranged in the tyre to be adjacent to the remaining side wall, and then arranging those tyres in the wall so that the

remaining uncut side wall generally faces downwards.

37. A method as claimed in claim 36 wherein in (b), a liner is positioned between the removed and remaining side walls to cover the lower opening of the tyre when it is arranged in the wall.

38. A method as claimed in claim 36 or claim 37 wherein the cut tyres are substantially filled with a fill material in the finished retaining wall.

39. A method as claimed in any one of claims 36 to 38 wherein the courses are constructed in accordance with the method as defined in any one of claims 25 to 31.

40. A method for forming a retaining wall for retaining an embankment or similar including the step of positioning in the wall a reinforcing section that is formed from:

(a) portions/sections cut from one or more tyres and arranged in a grid-type formation;

(b) strips cut from one or more tyres; and/or

(c) one or more conveyor belts.

41. A method as claimed in claim 40 wherein an outer face of the wall is defined by arranging a plurality of elements in a plurality of courses adjacent to the embankment to define the face.

42. A method as claimed in claim 41 wherein, prior to or after the arranging of each course, a reinforcing section is attached to that course.

43. A method as claimed in claim 42 wherein, prior to attaching the reinforcing section to each course, the reinforcing section is pre-formed into a grid structure by joining together a plurality of tyre tread sections, a plurality of tyre side wall sections and/or a plurality of conveyor belt sections.

44. A method as claimed in any one of claims 41 to 43 wherein the elements are tyres.

45. A method as claimed in claim 44 wherein at least some of the tyres have an intact tread portion.

46. A method as claimed in any one of claims 41 to 45 -- wherein the face of the wall is formed using a method as defined in any one of claims 25 to 39.

47. A method as claimed in any one of claims 40 to 46 wherein the conveyor belt sections are cut from a mining conveyor belt.

48. A reinforcing section for use in retaining an embankment or similar that is formed from:

(a) portions/sections out from one or more tyres and arranged in a grid-type formation;

(b) strips cut from one or more tyres; and/or

(c) conveyor belt portions/sections.